Queens College, Department of Physics

Physics 237 & 611

Classical Mechanics

Spring 2025 Instructor Prof. Lev Deych

Textbooks:

Classical Mechanics, John R. Taylor, University Science Books, 2005.

Class hours: Tuesday and Thursday 12:15 – 2:05 pm

Room: KH 323

Class format: In person

Office hours: by appointment via Zoom or in person.

1. **Reading and questions**. You will be assigned sections from the book to read **before the** class and come up with at **least four questions** on the topic of the assigned reading. The questions shall be submitted in writing no later than 11:59 am (noon) on the day preceding each class and must be submitted via Assignment section of the course site on Brightspace. The questions must be thoughtful and relevant to the assigned material. I won't accept "lazy" or irrelevant questions. Lazy questions are those which ask me to explain an equation or a formula or a concept without specifying what exactly in this equation, formula or concept seems unclear. Such questions, as well as any other questions, showing the lack of intellectual efforts in formulating them, will be rejected, and the grade for the assignment will be appropriately reduced.
2. **Lectures**. The classes will begin with me briefly reviewing the material you were assigned to read with emphasize on the questions that you have submitted. After that I will go over a few problems similar to those assigned as homework.
3. **Exams**. There will be two midterm exams and a final exam. Each midterm exam will contain four quantitative problems on the material covered prior to the exam. Final exam will contain six problems and will be cumulative. No make-up exams are given unless you have a documented medical problem or have made arrangements with me in advance.
4. **Problem sets.** Each class you will be assigned problem sets, which you will have to submit by a specified deadline. Submitted solutions must include all steps taken to reach the solution, must be legible. Solutions which I can't read will be given a grade of zero. **Typed solutions will earn an extra 5 points**. HOMEWORK LATE BY LESS THAN A DAY WILL INCUR 10% GRADE REDUCTION, LATENESS BETWEEN ONE AND TWO DAYS WILL RESULT IN 20% GRADE REDUCTION, ASSIGNMENTS SUBMITTED LATE BY MORE THAN TWO DAYS WILL BE ASSIGNED GRADE ZERO UNLESS PRIOR ARRANGEMENTS HAVE BEEN MADE.

Grading

First let me formulate my attitude toward formal grading. I want to state from the outset that grading in general is subjective, and I am not going to pretend (dishonestly) that it is not. We are not dealing with a multiplication table and with multiple choice tests, so, any grading is always a matter of instructor's judgements. Sure, there is less room for subjectivity when grading a solved problem in mechanics then, say, to grading an essay in an Englich Comp. class, but it is still there. My promise to you that I will grade your work fairly, to the best of my ability and that my grades will only depend

on the quality of your work as I understand it, and that any other factors (race, gender, religion, native language, or how annoying or pleasant you personally are) won't affect my assessment of your work. If you feel that I made a mistake, you are welcome to talk to me about it. I am not afraid to admit a mistake and will happily do so, if, of course, a mistake would be mine, indeed.

Another important point is that I do not treat grading just as an assessment and punishing tool, but first of all as an educational tool. Thus, if you have objective difficulties in completing an assignment on time, I will give you an extension. If you feel that you can do better if given a second chance to do the assignment, I will grant it to you (except of question assignments, which must be submitted by the set deadline, and no extensions or second chances will be given for these assignments).

a) An average of midterm exams contributes 25% of the grade

b) Final exam: 30% of your grade.

c) Pre-class question assignments: 20%

d). Problem sets contribute 25%

Schedule

Dates	Topics	Reading assignments	Problem sets (problem numbers in the red font are for **611 students only**)
01.28 Tu.	Newton's laws of motion,	Sections 1.1 – 1.6	
01.30 Th	Newton Laws in polar coordinates.	Section 1.7	PS1. 1.19, 1.37, 1.41, 1.48, 1.49 Due 02.04
02.04 Tu.	Projectiles with drag.	Sections 2.1 – 2.4	
02.06 Th.	Motion in the magnetic field.	Sections 2.5 – 2.7	PS 2. 2.8, 2.11, 2.29, 2.47, 2.53, 2.42 Due 02.11
02.11 Tu.	Conservation of momentum,	Sections 3.1 – 3.3	
02.13 Th.	Angular momentum	Section 3.4 – 3.5	PS 3. 3.2, 3.4, 3.11, 3.18, 3.29, 3.22 Due 02.18
02.18 Tu.	Monday schedule		
02.20 Th.	Kinetic and Potential energy.	Sections 4.1, 4.2	
02.25 Tu.	Forces as gradients of potential energy.	Sections 4.3 – 4.5	
02.27 Th.	Energy for one-dimensional and many particle systems.	Sections 4. 6 – 4.10.	PS 4. 4.3, 4.9, 4.16, 4.20, 4.31, 4.38 (a) Due 02.30
03.04 Tu.	Midterm 1. Chapters 1 - 4		
03. 06 Th	Wednesday schedule		
03.11 Tu	Free harmonic oscillator.	Sections 5.1 – 5.4	
03.13 Th.	Driven oscillator. Resonance.	Sections 5.5, 5.6	PS 5. 5.2, 5.16, 5.26, 5.33, 5.40, 5.44 Due 03.18
03.18 Tu.	Coupled oscillators.	Sections 11.1 – 11.3	PS 6. 11.3, 11.5, 11.9 Due 03.20
03.20 Th.	Calculus of variations.	Chapter 6	PS 7. 6.11, 6.15, 6.20, 6.22 Due 03.23.
03.25 Tu.	Lagrange's equations	Sections 7.1 -7.4	

03. 27 Th.	Examples of Lagrange's equations.	Sections 7.5 – 7.8	PS 8 7.3, 7.15, 7.20, 7.29 Due 03.30
04.01 Tu.	Lagrangian approach to coupled oscillators.	Section 11.4 – 11.7	PS 9 11.14, 11.18, 11.26 Due 04.05
04.03 Th.	Additional problems on chapters 5 – 7,11	No questions	
04.08 Tu.	Two-body central field problem.	Sections 8.1 – 8.4	
04.10 Th.	The Kepler's orbits.	Sections 8.5 – 8.7	PS 10 8.1, 8.9, 8.12, 8.18, 8.28, 8.31 Due 04.21
04.12 – 04.20 Spring recess			
04.22 Tu.	Exam 2 Chapters 5-8, 11		
04.24 Th.	Non-rotating noninertial frames. Tides.	Sections 9.1, 9.2	
04.29 Tu.	Rotating noninertial frames.	Section 9.3 – 9.7	
05.01 Th.	Coriolis force and Coriolis acceleration.	Section 9.8 – 9.10	PS 11 9.2, 9.9, 9.13, 9.18, 9.27 Due 05.04
05.06 Tu.	Tensor of inertia.	Sections 10.1 – 10.5	PS 12 10.10, 10.15, 10.22, 10.27, 10.36 Due 05.07
05.08 Th.	Hamiltonian equations.	Sections 13.1 – 13.5	PS 13 13.5, 13.10, 13.18, 13.20, 13.26 Due 05.10
05.13 Tu.	The collision cross-section	Sections 14. 1 – 14.4	
05.15 Th.	Calculating the differential cross-section	Section 14.5 – 14.6	PS 14 14.4, 14.6, 14.11, 14.18